

RAPTOR RESEARCH NEWS

Volume 4

*Numbers one through six
January - December, 1970*



RAPTOR RESEARCH FOUNDATION, INC.

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Volume 4

Number 5

September–October 1970

Editors: Byron E. Harrell: Donald V. Hunter, Jr.



The *Raptor Research News* is designed as an informal information exchange. Contributions are edited, but are not usually submitted for refereeing as in formal scientific journals of record. Some of the items are progress reports or expressions of ideas to stimulate discussion; thus citations of contents of the *News* should be avoided unless approval is received from the author.

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NOTES, NEWS, AND QUERIES

Raptor Research Abstracts Delayed. Last August questionnaires containing lists of periodicals and requests for assistance were sent to a number of Raptor Research Foundation members asking them to aid in the large undertaking of the RRF Abstracting Service. Many of these people have indicated a willingness to help when the topic was brought up at the Cornell Conference. A few questionnaires were returned with helpful suggestions and comments. However, only one solid offer to help abstract articles was received. This has necessitated our delaying publication of the first *Abstracts* until January, 1971 at the earliest (if at all?). Members who have paid 1970 dues for the *Abstracts* will be credited for 1971.

To be worthwhile the *Abstracts* must necessarily be comprehensive. This is too large an undertaking for one person, or even a few people, to do in his spare time. Anyone wishing to help will be sent a list from which preferred periodicals to be abstracted may be selected. Little difficulty should be encountered in finding abstractors for major journals; special assistance will be required for geographically localized and professionally specialized journals.

Raptor Research Reports. This series, *Raptor Research Reports*, is issued by the Raptor Research Foundation for recording materials such as literature reviews, bibliographies, translations, and reprints, thus providing access to often scattered primary sources. The series will be inaugurated in January, 1971 with the first part of a review of serial literature entitled "Falconiform Reproduction: A Review. Part 1. The Pre-nestling Period" (111 pages) by Richard R. Olendorff. It will be available to RRF members for \$2.00 and non-members for \$2.50. Orders are now being taken.

Addition to Endangered List. The Department of the Interior in a recent news release announced the addition of several more species of mammals, birds, and fish to the domestic endangered species list. The only raptor on this list of additions is the tundra peregrine (*Falco peregrinus tundrius*).

Raptor Research Represented at NAFA Meet. Members of the

RRF Pathology Committee will present a panel discussion at the North American Falconers' Association meet to be held in Yankton, South Dakota, over Thanksgiving week. In addition there will be a meeting of the RRF Breeding Committee.

ARTIFICIAL INCUBATION

by

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In a current breeding project, nine eastern Kestrel eggs from our captive pair were incubated artificially from day 1. Seven of the nine were fertile. Eggs were incubated at 99 degrees F. dry bulb and 88 degrees F. wet bulb. Eggs were candled daily, beginning with day 7. This was the day which gave the most consistent results of determining fertility on the basis of observable vitelline vasculature. One of the embryos died at 13 days; another died at 15 days. The remaining five progressed apparently satisfactorily until the 24th day of a 28 day incubation. On day 25 the embryos were all dead.

Examination of the embryos showed all to be apparently normal. The yolk sac was about the size that would be expected for an embryo four days prior to hatching. All had broken through the air cell successfully.

Although no evidence for such could be found, a nutritional deficiency was suspected. To prove or disprove this, it was decided to incubate some different species using the same methods as were employed with the Kestrels. Because of availability, four English Sparrow eggs, five Starling eggs, and four domestic duck eggs were put in the incubator at a stage when no vessels could be seen. All those incubated proved to be fertile.

Two of the English Sparrow embryos died on days 8 and 9, respectively. The other two hatched apparently normally at 14 days.

The Starling embryos died one after the other on days 7, 9, 10 and 12, respectively. The fifth egg hatched sometime between late afternoon on day 17 and late morning on day 18, but was dead and not completely out of the shell when discovered.

Three of the four duck eggs hatched on the 30th day of incubation. The fourth was dead at 27 days and found to have an incompletely absorbed yolk sac when examined.

Although the eggs were out of the incubator only three or four minutes a day to be candled, it was decided to try another clutch of eggs and not handle them at all. Five English Sparrow eggs were put in the incubator before any vessels were visible. The incubator was not opened until the 14th day. At this time four eggs had hatched. The fifth egg proved to be infertile.

The evidence from such a small-scale "experiment" is anything

but conclusive. The results, however, have served as a warning to us. In our anxiety to find a newborn falcon in our incubator we checked and handled the eggs daily. We felt that this action was no more critical than the brooding female taking time out to eat every day and leaving the eggs.

Several people have written articles expressing the belief that raptor eggs are more susceptible to chilling than most other species. Although we still cannot find any physiological reason for this, we find ourselves believing it more. Future eggs will most certainly be left undisturbed.

INDUCED MOLT

by

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For some time falconers have discussed the idea of induced molt. Various methods including photoperiod changes and hormone administration have been tried. In our short reading, however, we have never seen anyone write that they were completely satisfied with any particular method. We have not seen any statistics on how long these induced molts take. Lacking comparisons here are the results of our experiment with eastern Kestrels (*Falco sparverius*).

Assuming that wild birds behave as captive ones, the female bird begins her molt almost simultaneously with the onset of incubation. The male's molt is delayed somewhat and from our experience seems to hinge on the brooding of the female. In one experiment in which our female brooded her eggs for only five days, her molt started and progressed normally after her short brood ended, but the male did not molt until he was induced artificially three months later. By this time the female had completed over half her molt.

The female's molt was, to our knowledge, normal. She lost her flight feathers symmetrically, and each replacement was almost entirely in place before the adjacent old feathers were dropped.

The male's molt was quite different and was initiated by a reduction in photoperiod from 16 hours daylight and eight hours darkness to four hours daylight and 20 hours darkness. Five days after the start of this cycle he lost his first tail feather. Fifteen days later he was virtually grounded, having to jump from perch to perch and to the food block. Three days after that he had lost another primary from each wing, leaving him only two primaries on each.

At this time we switched to eight hours of daylight and 16 hours of darkness in order to promote feather growth. No change in the diet of mice and chicks was ever made.

The male's feather growth was as entire as his molt. All the tail and wing feathers grew simultaneously—just as they had dropped. Two months following the onset of his molt the male had a complete complement of new feathers. All of his tail feathers were the same length, while the outer-most tail feather of the female on both sides still lacked about one half inch of being even with the others.

The female's molt seemed to be hastened by increased darkness also, but as she had already been molting three months, it was impossible to tell if hers would have been as dramatic as the male's.

NOTES ON OWLS FOR OTHER AMATEURS

by
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We are solely interested in breeding captive birds for the purpose of returning the young to the wild; thus our experiments in this direction have been purely as a means toward an end. Our main interest is owls, and our first attempt was with a Tawny Owl.

We took our first injured bird in 1954, and tried our first breeding experiments five years later. In our ignorance we thought all that was needed was to introduce male to female. We made a most complicated series of traps on the aviary roof, so that visiting owls could literally drop in during the night. We were left with some ridiculous situations, such as fifteen owls inside—none of which seemed particularly keen to regain its freedom in the early dawn of the next day. One's charitable instincts become somewhat dulled when one has crept out in pyjamas to release the birds, only to find them reluctant to go, and one's own tame bird taking refuge from her would-be mates inside one's jacket.

Now, of course, we know that birds need some time to settle down and become familiar with their surroundings before they will attempt to breed. This is particularly true of birds that have been reared in captivity. Occasionally wild ones that have been injured and brought in during the breeding season will settle immediately.

We were determined to breed the Tawny Owls, especially as we could find no one who had done it before. We spent hours and nights studying the wild owls, especially at breeding time. It was difficult to know how many of their actions preceeding mating were an essential part of their breeding behaviour. At first we built the aviaries as large and as natural as possible. Now we know that they appear to be more content if they are confined; the amount of flight area available is immaterial.

We tried putting nest boxes in different positions, but we had no success with any until we put the boxes as high up as possible and facing east.

The female Tawny Owl laid and brooded for two years, but the cock showed little interest in her. We wondered how important a part the establishing of territorial boundries played in their actual breeding cycle. We introduced a second cock into the aviary for several days, and three young owls were produced that year, 1962.

This is well worth trying, for even with our European Goshawks, the introduction of a second cock caused our own cock to mount the hen almost immediately, and their first egg was laid the following week.

We have found that birds which have been tame can be dangerous during breeding time. My own tame Tawny Owl knocked me unconscious last year, leaving me in a rather nasty situation, for only my small son was there at the time, and the owls would allow neither him nor the neighbours to rescue me. Previously, she had allowed me to feed her all the time she was on the nest, although she would tolerate no one else, and would even try to attack them through the wire.

Birds are most likely to desert the nest soon after they have started brooding or just before the young are big enough to fledge. Once the parents are sitting firmly there is little that will disturb them. Stray dogs, especially those that jump at the wire, will upset them. Without doubt, however, it is young children that upset nesting birds most. Three times, our Tawny Owls have deserted their nests following a visit by people who brought young children. I have a theory that it is the high pitched voices of the children which upsets the birds.

Surely we cannot be the only people who find that strangers think ours must be a fine place to visit, particularly on weekends. We have come home and found perfect strangers walking round our back garden. How does one explain without giving offence?

As soon as our owls were preparing to breed, we brought in a supply of day-old chicks. These seemed ideal, as their balanced diet and antibiotics were sure to pass some of their immunity on to our birds. The young were hatched, but despite added vitamins and varied diets, some of the chicks suffered from deficiencies. This happened not once, but time and time again; there was apparently no rhyme nor reason to it. There would be two perfect and two imperfect chicks in the same brood. It has been heartbreaking; deficient sight, deafness, inability to stand or balance properly, rickets. At last we feel we are solving this problem. I can only touch on some of the things we have discovered, for the whole subject merits a page of its own.

All our problems have been traced back to deficiencies in the birds' diet. Besides adding vitamins, we had been adding chopped chicks, but it seems that this was not enough. The chicks were not rich enough in calcium to be of value to the owlets. The bones of birds are not as solid as those of rats or mice, and, of course, those of chicks are even less firm. It is important that the parent birds have a correctly balanced diet when egg laying is imminent, for deficiencies can be passed on to the young at this stage. Most of the veterinary preparations on the market are planned for dogs and cats rather than

for birds; they are not always adequate, especially during the period of rapid growth around the third week. It is also as important to add trace elements, such as manganese, as it is the more familiar vitamins.

It seems we have not yet gotten completely on top of this dietary problem, for although our Goshawks and Kestrels laid and brooded eggs this year, the eggs were pure white in colour with no trace of the colouring one would expect.

Although we had the first breeding success in 1962, we felt we could not claim any success until 1969 when the young that we had bred in captivity, themselves bred in the wild. It was not a hundred per cent successful, however, because we had the doubtful pleasure of having the Tawny Owl bring three young to our bedroom window every night for a month, refusing to move until I got myself up and put out chicks on the sill for her. What with the owls screeching and John burying his head beneath the bedclothes and moaning because we had not taken up droughts [checkers] as a hobby, these were not the most restful nights.

Our owl has bred again this year and two other pairs were on eggs. I have yet to hear if they brought off their young.

We do not like ringing [banding] our birds. All we want to know is if they are fending for themselves in the wild. Gentian violet beneath the tail is the best means of identification, and for us is superior to rings which are not so easy to see in flight. With dark birds, like Guillemots, I snip a bit out of their tails to give them a slightly forked appearance. Either method is satisfactory.

Besides the Tawny Owls, we have now gone full circle with Barn Owls. Three pairs have bred in the wild, one pair in an old hollow ash tree right outside our kitchen window. I do not think anyone can appreciate how we have felt. The hen has allowed us to sit on the fence by the tree, and on more than one occasion she has actually flown between us. Last week the young left the nest and flew. Somehow, as we watched them in the fallow Lincolnshire sunset, all the worries and disappointments of the past sixteen years seemed so very worthwhile.

I would like to use this opportunity to mention and thank the following people for their advice and help: John Cooper, M.R.C.V.S.; Graham Sutherland, M.R.C.V.S.; and Andrew Greenwood, who is hoping to qualify this coming year.

EXCERPTS FROM THE ABSTRACTS OF THE XV
INTERNATIONAL ORNITHOLOGICAL CONGRESS
(held at The Hague 30 August-3 September 1970)

Selected by Frances Hamerstrom
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Symposium on Birds and Man:
the Mounting Threat of Chemical Pollution

J. A. KEITH—Pesticide Section, Canadian Wildlife Service

Residue levels of chemical pollutants in North American birdlife

Residues of organochlorines have been the most commonly reported, and very recently attention has been paid to heavy metals. Among organochlorines, the long-known insecticide metabolite DDE, and the recently identified PCB's of industrial origin, are found in widely ranging amounts in virtually all specimens examined. Generally, the highest residue levels of both occur in birds that eat other birds or fish, or that feed on marine plankton. Among heavy metals, mercury is now being established as a pollutant of both terrestrial and aquatic birds, with highest levels in raptors preying on grain-eating animals, or in birds that eat fish. Relationships between residues in birds and suspected sites of chemical use are very tenuous for organochlorines and more direct for mercury. The very recent reports of residues of PCB's and mercury do not reflect new uses, these chemicals have probably been significant pollutants of birdlife for several decades.

A. G. JOHNELS—Research Department, Swedish Museum of Natural History, Stockholm, Sweden

The avifauna of Sweden and the environmental contamination with organomercurials with a note on the presence of chlorinated hydrocarbons.

In Sweden elaborate studies have been made on the contamination of the natural environment with mercury. In terrestrial habitats the use of alkyl-mercury compounds was responsible for a serious contamination of different wildlife species. The analysis of feathers of birds of prey turned out to be a sensitive

detection system to discover the type of application which caused the contamination of wildlife. Analyses of feathers of goshawks from museum collections clearly demonstrated that a sudden increase in the mercury levels occurred in 1940. In that year alkyl-mercury compounds were introduced as seed dressing materials in Sweden.

J. G. WIT—Institute of Veterinary Pharmacology and Toxicology.
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Metabolism of foreign compounds by different classes of birds

The determination of biological halflife and the metabolic patterns of drugs, toxicants or model compounds are well known aspects of detoxication studies in mammals and insects, but rarely undertaken in birds. From experiments with mammalian liver preparations in vitro it became clear that many xenobiotic compounds are metabolized by the smooth-surfaced microsomes and by the cytoplasmatic enzymes, yielding as a rule more water-soluble substances. Most studies however were performed with the familiar laboratory species (rats, mice, rabbits). These biochemical investigations are supported by an impressive body of knowledge of the structures and ultrastructures of mammalian tissues.

Some results will be presented with respect to the drug enzymes in kestrel livers and the occurrence of enzymic glutathione conjugations in wild bird livers with foreign compounds as precursors of mercapturic acids. A short discussion is given of the ability of birds to deal with foreign compounds and of the possible role of the natural diet. During these studies we were struck by the many gaps in background information, both biochemical and cytological. It follows that caution must be exercised when employing methods proven in mammalian studies in other animal classes.

R. G. HEATH, J. W. SPANN, J. F. KREITZER and C. VANCE—Patuxent Wildlife Research Center, Laurel, Maryland 20810, U.S.A.

Effects of polychlorinated biphenyls on birds

Toxicities of six commercial preparations of polychlorinated biphenyls (PCB's) were studied on penned mallards (*Anas platyrhynchos*), pheasants (*Phasianus colchicus*), bobwhite (*Colinus virginianus*) and Japanese quail (*Coturnix coturnix*) at the Patuxent Wildlife Research Center near Laurel, Maryland. LC₅₀'s, expressed as p.p.m. of PCB in dry feed, were determined for the Aroclor

(Registered name, Monsanto Company) "compounds" 1232, 1242, 1248, 1254, 1260, and 1262 on 2-week-old birds fed treated diets for 5 days. Aroclor toxicity, generally less than that of DDT, was found to be directly related to increased chlorine percentage (last two digits of Aroclor number). Low dietary levels (25 and 50 p.p.m.) of Aroclor 1254 are evaluated in 2-year reproductive studies on mallards and bobwhite.

I. PRESST and D. A. RATCLIFFE—The Nature Conservancy, Monks Wood Experimental Station, Abbots Ripton, Huntingdon, U.K.

Effects of Organochlorine insecticides on European birdlife

Contamination of terrestrial, freshwater and marine birds in Europe by persistent organochlorine insecticides is widespread. In densely populated countries with intensive agriculture it may be universal. Many wilderness species are seasonally at risk to contamination because they migrate and predators can obtain residues from prey migrating from areas with insecticide use.

There appear to be differences in effects of organochlorine residues between species, probably because of a combination of differential exposure according to varying habitat and differential response according to interspecific physiological and behavioural differences.

Sub-lethal effects appear to be mainly on reproduction. These cause reduced success in some species, mainly raptors, and follow a characteristic syndrome involving decreased eggshell thickness, parental egg-breakage, reduced output of young and finally an apparent inability to lay eggs. Other species with decreased shell thickness and egg-breakage still fledge young because they lay repeat clutches which are successful. In many species the residues apparently have no obvious effects. Reproductive failure, if severe enough, can eventually cause population decline.

Lethal poisoning of birds has followed the release of organochlorines into lakes and rivers in industrial and agricultural effluents, heavy local applications, and their use in spring as a seed-dressing. Relatively large amounts can pass along food chains to predatory species which in turn may be killed. There is no evidence of permanent effects on populations of granivorous species, but several terminal predators have shown spectacular declines apparently due to exceptional mortality caused by organochlorine poisoning.

Restrictions on organochlorine insecticide use has reduced lethal poisoning, improved breeding success and been followed by a partial recovery of raptor populations. Conservation of European birds is

thus linked with future use of organochlorine insecticides.

D. W. ANDERSON and J. J. HICKEY—Department of Wildlife Ecology, University of Wisconsin, Madison, Wisconsin, U.S.A.

Eggshell changes in certain North American birds

Museum data, field correlations, and controlled experiments all confirm D. A. Ratcliffe's hypothesis that certain raptor population crashes of the past two decades are characterized by historically unprecedented changes in eggshell thickness and weight that in turn have led to egg breakage, disappearance, and egg eating. The unique change began in 1947 on a wide-scale basis in peregrine falcons (*Falco peregrinus*) in eastern North America as well as Europe and extended to fish-eating birds and other raptors. These recent changes in eggshells vary geographically within a given species and, at least locally, between populations and in some cases between individuals. Often they vary from one year to the next. Although many factors may affect eggshells in birds, the remarkable phenomenon of widespread eggshell change proves to be consistently associated with DDE levels in laying females and their eggs; relations between residues of other chemical pollutants remain to be carried out. Some of the eggshell changes, while statistically significant, are not having an obvious and critical effect at the population level. Obvious reproductive failures appear to be correlated with a mean decrease on the order of greater than 20 per cent. in shell thickness and weight. Among the species that appear to be suffering population effects, either locally or regionally, as a result of this DDT pollution are: (1) regionally to widespread, Peregrine Falcon; (2) locally to regionally, Brown Pelican (*Pelecanus occidentalis*), Double-crested Cormorant (*Phalacrocorax auritus*), Cooper's Hawk (*Accipiter cooperi*), Bald Eagle (*Haliaeetus leucocephalus*), Osprey (*Pandion haliaetus*), Black-crowned Night Heron (*Nycticorax nycticorax*); (3) locally, Marsh Hawk (*Circus cyaneus*), Prairie Falcon (*Falco mexicanus*), Herring Gull (*Larus argentatus*). Eggshell changes of a minor nature are evident in: Common Loon (*Gavia immer*), White Pelican (*Pelecanus erythrorhynchos*), Rough-legged Hawk (*Buteo lagopus*), Red-tailed Hawk (*B. jamaicensis*), Red-shouldered Hawk (*B. lineatus*), Broad-winged Hawk (*B. platypterus*), Golden Eagle (*Aquila chrysaetos*), Sparrow Hawk (*Falco sparverius*), Great Blue Heron (*Ardea herodias*), Great Horned Owl (*Bubo virginianus*), Common Crow (*Corvus brachyrhynchos*).

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